

**EDGEWOOD ARSENAL
TECHNICAL REPORT**

EATR 4618

**THE EFFECT OF SESSION LENGTH ON
ZITA PERFORMANCE**

by

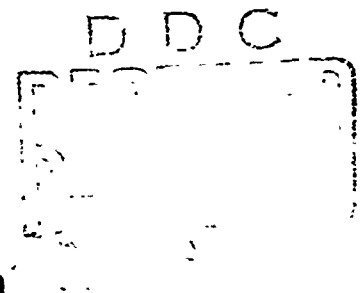
Kragg P. Kysor

March 1972



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Medical Research Division

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Task 1W062116AD1901

**DEPARTMENT OF THE ARMY
EDGEWOOD ARSENAL
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FOREWORD

The work described in this report was authorized under Task IW062116AD1901, Techniques of Evaluating Effects of Chemicals, Performance Evaluation of Chemically Exposed Personnel. This work was started in January 1965 and completed in December 1966.

The volunteers in these tests are enlisted US Army personnel. These tests are governed by the principles, policies, and rules for medical volunteers as established in AR 70-25.

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DIGEST

The Zero Input Tracking Analyzer (ZITA) is a human performance measuring device that utilizes a servo principle in providing a perceptual motor task. It was found that subjects who were trained with 3-minute sessions acquired the task more rapidly than a matched group trained with 2-minute sessions. Scores obtained from the 3-minute sessions were more reliable.

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THE EFFECT OF SESSION LENGTH ON ZITA PERFORMANCE

I. INTRODUCTION.

The ZITA (Zero Input Tracking Analyzer) is a relatively new device for measuring drug responses. Consequently, there are few data on which to evaluate the reliability of the measurements made using this instrument or the amount of practice necessary for subjects to obtain stable baselines. A previous study* using data obtained in 1965 indicated that the ZITA task, consisting of 2-minute practice sessions, had rather marginal reliability. In 1966, however, a series of training sessions was conducted that allowed the subject 3 minutes per session. In view of the general principle that the reliability of a test is proportional to its length,** it seemed desirable to see whether scores obtained from the longer sessions would result in an improved reliability estimate. In addition, it is of interest to ascertain whether the longer practice sessions affect the acquisition of the task.

II. EXPERIMENTATION.

A. Apparatus.

The ZITA is a device† that utilizes a servo principle in providing a perceptual motor task. The task is to center a spot of light moving across a 6-inch scale by left and right movements of a control stick. The distance between the subject's eyes and the light spot is approximately 20 inches. The degree of correspondence between stick and light movements can be experimentally controlled by preselecting a rate of light-spot movement built into the device. The rate of light-spot movement is described in terms of angular acceleration, which was 207 mils/sq sec in this study. This setting has been found to be a level of difficulty within the range of human ability.

B. Subjects.

The subjects were 127 US Army volunteers (enlisted men) between the ages of 18 and 29 years, whose intelligence†† ranged from low normal to very superior. They were selected for drug testing at Edgewood Arsenal and found to have no significant psychopathological abnormalities as determined from the Minnesota Multiphasic Personality Inventory (MMPI) and psychiatric interviews.

C. Procedure.

The subjects were divided into two groups and trained with either 2- or 3-minute trials per session. The sessions were conducted in blocks of five. Intersession times varied from 5 minutes to an hour; intervals between blocks of sessions ranged from 2 to 16 hours.

*Kysor, K. P. EATM 114-13. Standardization Studies With the Repetitive Psychometric Measures. II. Comparison With the Zero Input Tracking Analyzer and an Anagram Test. November 1967. UNCLASSIFIED Report.

**Guilford, J. P. Psychometric Methods. 2d Ed. p 391. McGraw-Hill, New York, New York. 1954.

†Walker, N. K., and Burkhardt, J. F. The Development of Tracking Tasks as Indicators of Stress. In EASP 100-11. Berdjis, C. C. Proceedings of a Contractors' Conference on Behavioral Sciences. 14 and 15 October 1965. February 1967. UNCLASSIFIED Report.

††Based on the General Technical score of the Army Classification Battery.

An analysis of variance for repeatable measures using two independent groups of subjects was used to determine the significance of differences that may exist between the means of scores obtained from the two training schedules. Intersession correlations* for the last five sessions of a 30-session series were obtained for each of the two training groups to estimate the reliability of the ZITA scores using each schedule.

III. RESULTS.

A graph of the performance of the two groups (figure 1) shows that the group trained at 3 minutes per session had mean error scores that were lower at each session than comparable scores of the group trained at 2 minutes per session. An analysis of variance (table I) between the two groups of means yielded an F ratio of 12.0 that is significant at the 5% level of confidence.

Table II shows a comparison between the two training groups of the test-retest correlations for the last five sessions. The range of correlations for the 2-minute sessions was from 0.63 to 0.74, whereas the range for the 3-minute sessions was from 0.79 to 0.88.

IV. DISCUSSION.

Although the previous analysis of the mean performance scores at each session for each of the groups favors the group trained at 3 minutes per session, there exists the possibility that the subjects of the 3-minute group were inherently superior in ZITA performing ability and/or the training of the 3-minute group gave them an advantage.

*All correlations performed in this study are Pearson Product-Moment correlation coefficients.

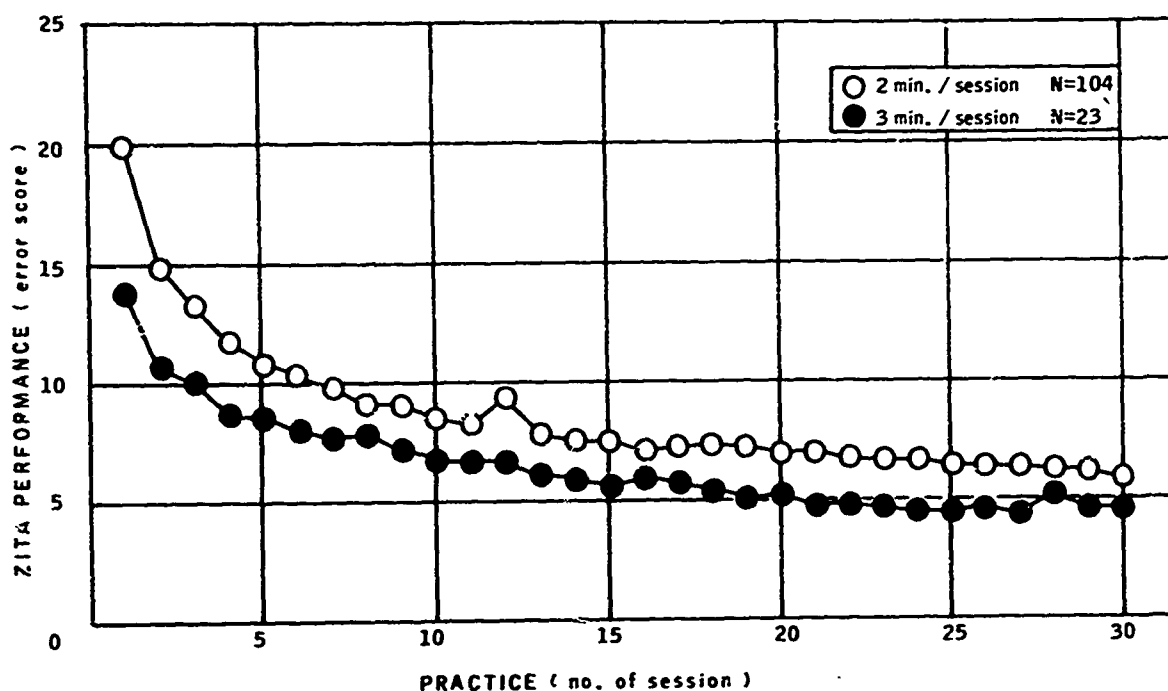


Figure 1. The Effect of 2-Minute Versus 3-Minute Sessions of Practice on ZITA Performance

Table I. Analysis of Variance for Session Length and ZITA Performance on Trials 1 to 30

Source	df	MS	F	P
Between subjects	126	222.1	12.00	0.05
A (session length)	1	2450.6		
Subjects within groups	125	204.3		
Within subjects	3683	16.7		
B (trials)	29	518.2	62.4	0.001
A X B	29	18.4	2.2	0.001
B X Subjects within groups	3625	8.3		
Total	3809	23.5		

Table II. A Comparison of the Intertrial Correlations for Two Schedules of Training on the ZITA

Session	Session length	
	2 min	3 min
26 vs 27	0.65	0.88
27 vs 28	0.63	0.82
28 vs 29	0.74	0.79
29 vs 30	0.68	0.85
Median	0.665	0.835

In an attempt to control the effect of ability, the scores for the first session were analyzed so that subjects could be matched from each group on the basis of their performance in the very first minute of practice. From this analysis it was possible to obtain 20 pairs of subjects whose scores were within an average of less than 1% of each other. The correlation between the two sets of scores was 0.99. The matched 2- and 3-minute groups each had mean performance scores of 14.6 for the first minute with standard deviations of 7.2 and 7.1, respectively.

When the session means for these matched subjects were plotted (figure 2), it could be seen that the differences between the means were reduced compared to those of the unmatched subjects (figure 1). Thus, assuming that the effect of ability differences had been eliminated, we examined the differences in training.

An analysis of the first 6 minutes of practice (figure 3) for each group shows that at the end of the first session, both groups were performing at approximately the same level. At the end of the second session, the 2-minute group had made an improvement in performance but not as much

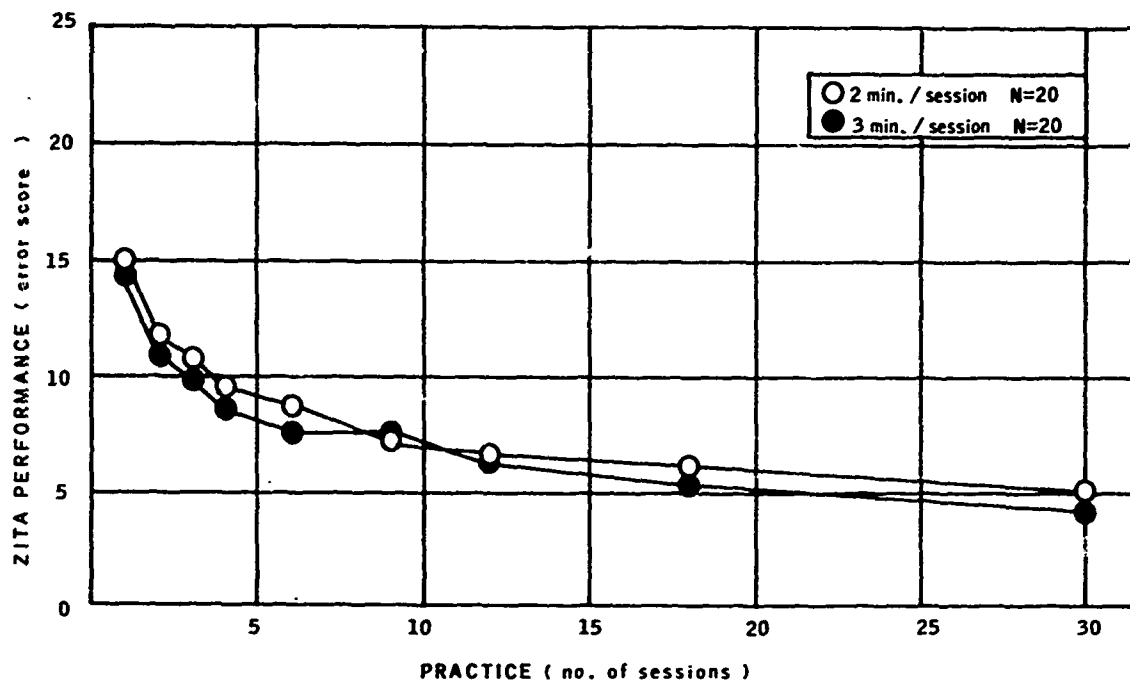


Figure 2. The Effect of Two Session Lengths of Practice When Subjects Have Been Equated for Ability

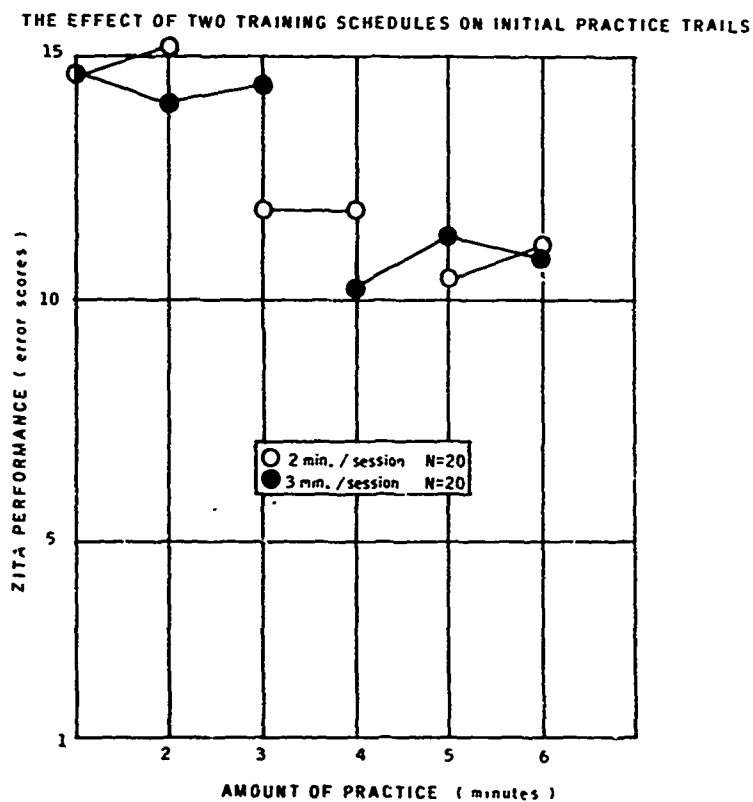


Figure 3. The Effect of Two Session Lengths of Practice During the First 6 Minutes of ZITA Training

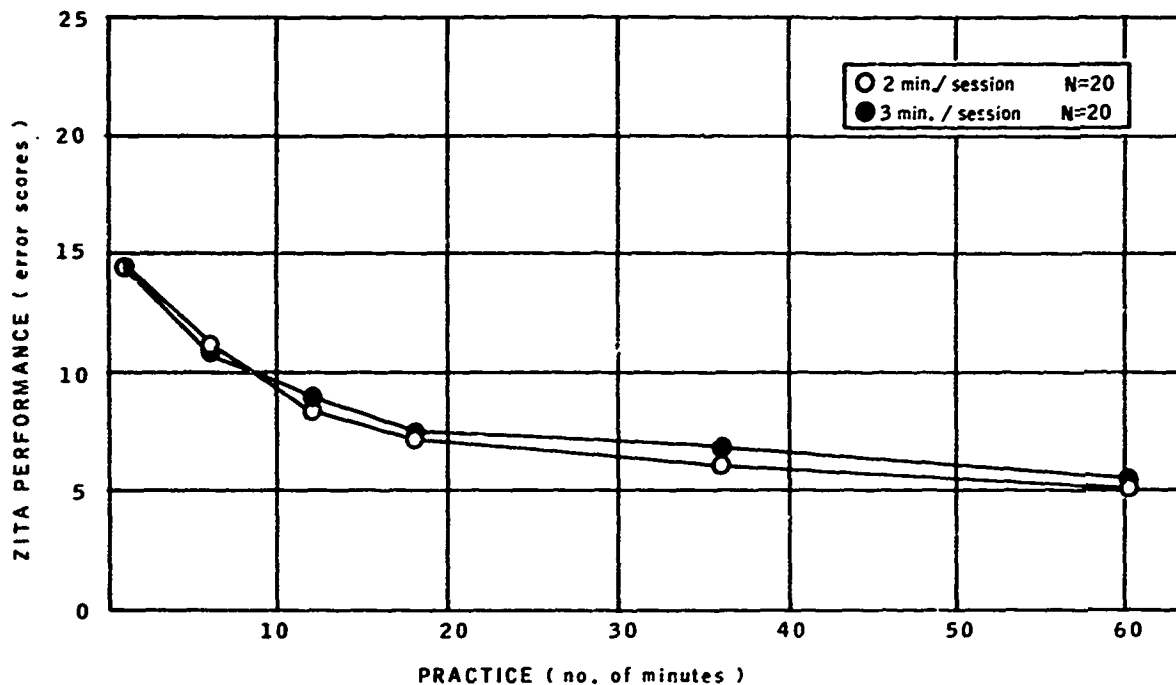


Figure 4. The Effect of Two Session Lengths of Practice When Subjects Have Been Equated for Minutes of Actual Training Received on the ZITA

as the 3-minute group had made at the end of their second session. However, at the end of the third session for the 2-minute group and the second session for the 3-minute group, both groups had had 6 minutes of practice and were again performing at the same level. Consequently, it was decided to compare the groups on the basis of equal minutes of practice rather than sessions. When this was done, it could be seen (figure 4) that the differences between the mean performances were reduced even further. It appears, then, that when the factors of ability and distribution of sessions are controlled, performance on the ZITA is almost entirely dependent on the number of minutes of practice that the subject receives.

V. CONCLUSION.

An analysis of the ZITA performance data on the basis of length of practice shows the advantage of 3-minute over 2-minute training periods. The extra minute of practice at each session appears to provide for more rapid acquisition of the task and, by virtue of the test's added length, results in more reliable scores.